15

Antioxidant activities of 15 local herbs in Songkhla province

. . 2559

2559

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Folin-Denis method
ABTS radical scavenging assay, DPPH radical scavenging assay Ferric-reducing antioxidant power (FRAP)

386.733±0.002 µg GAE/100g
58.767±0.006 µg GAE/100g

ABTS
100.169±0.017 mM
86.734±0.018 mM DPPH
99.637±0.042%
85.885±0.002%
645.158. ±0.020 µM
546.737. ±0.036 µM FRAP
trolox

Research Title Antioxidant activities of 15 local herbs in Songkhla province
Researcher Nunthida Limsettho
Faculty Science and Technology
Year 2016

Abstract

Local herbs are source of antioxidant biological compounds. The objective of this research are to determine phenolic compound and to study antioxidant activities of 15 selected local herbs in Songkhla province, such as *Cassia alata*, *Barleria lupulina*, *Schefflera leucantha*, *Citrus aurantifolia*, *Rhodomyrtus tomentosa*, *Ocimum sanctum*, *Senna siamea*, *Acacia insuavis*, *Centella asiatica, Tiliacora triandra*, *Azadirachta indica*, *Andrographis paniculata*, *Zingiber cassumunar, Eupatorium odoratum* and *Streblus asper*. They were extracted with water and ethanol to determine the tatal of phenolic compound by the Folin-Ciocalteu method and testing antioxidant activities by ABTS, DPPH and FRAP were conducted. It was found that water extracted showed the total phenolic compound and antioxidant activities were higher than ethanol extracted. In overview, the. *Rhodomyrtus tomentosa* extracted with water showed the highest total phenolic compound (386.733±0.002 µg GAE gallic acid/g) and *Senna siamea* ethanol extracted showed the highest (58.767±0.006 µg GAE gallic acid/g). *Azadirachta indica* water extracted and *Eupatorium odoratum* ethanol extracted showed the highest antioxidant activities by ABTS (100.169±0.017% and 86.734±0.018%, respectively). The *Barleria lupulina* water extracted and *Eupatorium odoratum* ethanol extracted showed the highest antioxidant activities by DPPH (99.637±0.042% and 85.885±0.002%, respectively). The *Streblus asper* water extracted and *Azadirachta indica* ethanol extracted showed the highest of Ferric reducing antioxidant power (645.158±0.020 µM and 546.737±0.036 µM, respectively). Antioxidant activities had the highest Trolox standard with both both water and ethanol extraction.

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ABTS

DPPH 95.953±2.877%

86.710±0.130% FRAP

645.333±10.291 µM

Research Title Antioxidant activities of 15 local herbs in Songkhla province
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Abstract

Local herbs are source of antioxidant biological compounds. The objective of this research are to determine phenolic compound and to study antioxidant activities of 15 local herbs in Songkhla province, include*Cassia alata, Barleria lupulina, Schefflera leucantha, Citrus aurantifolia, Rhodomyrtus tomentosa, Ocimum sanctum, Sennasiamea, Acacia insuavis, Centella asiatica, Tiliacora triandra, Azadirachta indica, Andrographi spaniculata, Zingiber cassumunar, Eupatorium odoratum* and *Streblus asper*. In overview, Water extract of *Azadirachta indica* showed the highest antioxidant activities by ABTS and DPPH (95.953±2.877% and 86.710±0.130%, respectively). While the water extract of *Streblu sasper* showed the highest of Ferric reducing antioxidant power (645.333±10.291 μM).

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1

1.1

(antioxidantion) (
, 2554)

flavanols dihydrochacones anthocyanin
(Raudone *et al.*, 2017)

(Deka
et al., 2013) diterpene lactones
(Widyawaruyanti *et al.*, 2014)
acoradiene camphene α-phellandrene
IC_{50} 8.3 (Panday *et al.*, 2014)
A. flavus LHPRS7 (Kumar *et al.*, 2013) 1 % trifluoroacetic
acid (Cui *et al.*, 2013)

1.2

1.2.1 15

ABTS radical scavenging assay,

DPPH radical scavenging assay, Ferric-reducing antioxidant power (FRAP) Folin-Ciocalteu method

1.2.2

1.3

1.3.1 15

. . 2559 . . 2560

1.3.2 2

1.3.3 DPPH, ABTS, FRAP assay Folin-Ciocalteu method

1.4

1.4.1

1.4.2

2

2.1

(free radical)

2

(, 2549)

(David *et al*., 2012)

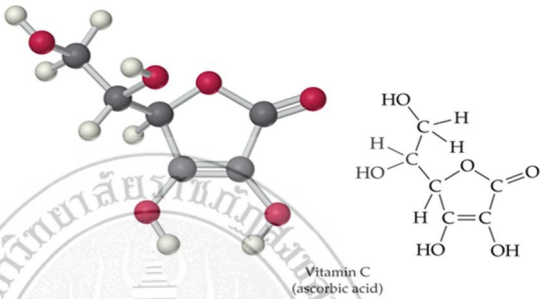
($O_2^{\bullet-}$) ($^{\bullet}OH$) ($RO^{\bullet}$)
($HO_2^{\bullet}$)
(NO) ($NO^{\bullet}$)
(ROS) superoxide, hydroxyl
(OH), peroxyl
ROS

lipid peroxidation
β-cell (Adriana
et al., 2012)

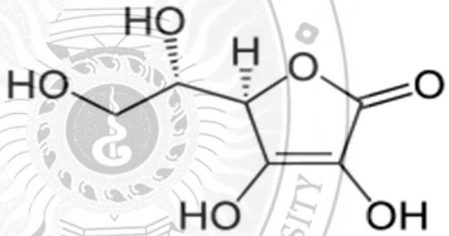
2.2

1. superoxide dismutase, glutathione peroxidase, catalase, peroxidase, cytochome C peroxidase (ceruloplasmin)

2. - ubiquinone, uric acid, bilirubin, albumin, sulfhydryl groups cysteine (,2552)



9.



2.1 (:http://www.myfirstbrain.com)

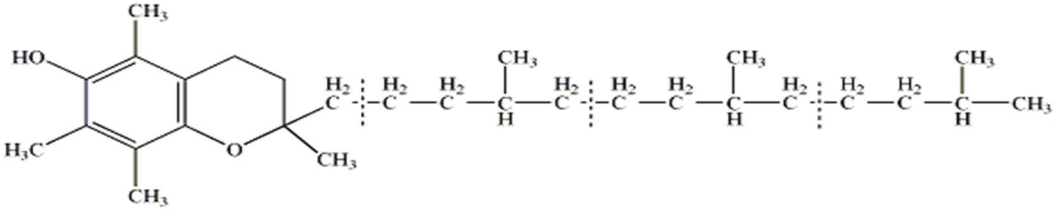
1.

($AsCH_2$) 2

1

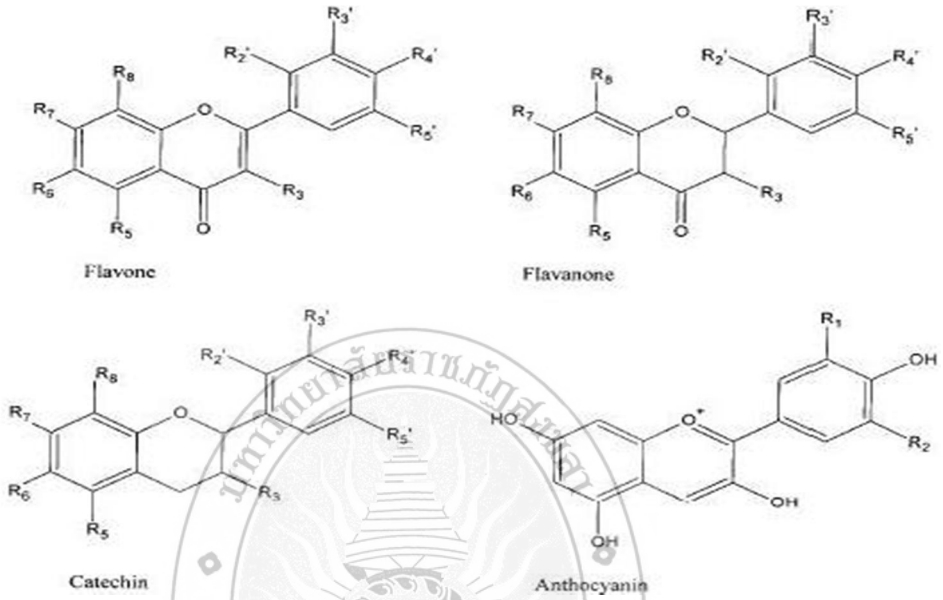
R• RH

(, 2551)



2.2 (: http://www.siamchemi.com)

2. tocopherol



2.3

(http://www.foodnetworksolution.com/wiki/word/2951/flavonoid)

3. (phenolic compounds)

8,000

2- (2-phenylbenzopyran) (, 2549)

( )

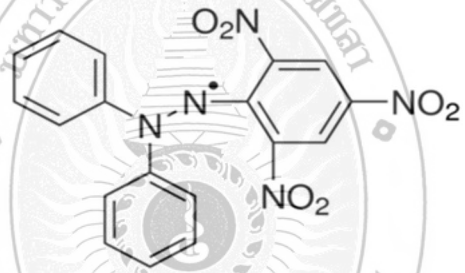
2.3

2.3.1 DPPH

DPPH (2,2-Diphenyl-1-picrylhydrazyl radical scavenging assay)

ABTS

515-517 nm



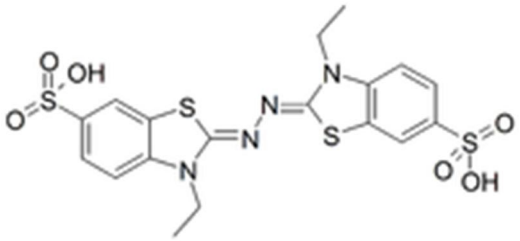
2.4 DPPH Radical
(: https://en.wikipedia.org/wiki/DPPH)

2.3.2 ABTS

ABTS (2,2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt assay) reagent ABTS stable radical aqueous solution

734 nm ABTS cation radical

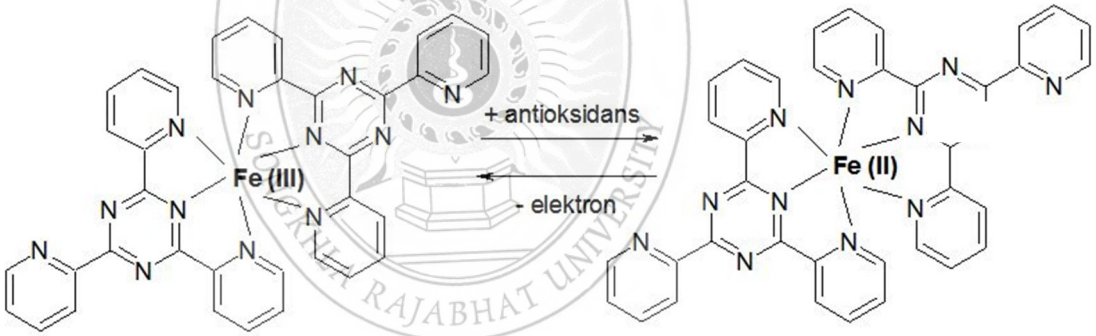
1. enzyme reaction ABTS cation radical peroxide, myoglobin
2. chemical reaction manganese dioxide, potassium persulfate, 2,2'-Azo-bis-(2-amidinopropane) (ABAP)



2.5 ABTS (: https://th.wikipedia.org/wiki/ABTS)

2.3.3 **FRAP**

ferric tripyridyltriazine (Fe^{3+}-TPTZ) ferrous tripyridyltriazine (Fe^{2+}-TPTZ) FRAP (the ferric reducing antioxidant power) 595 nm (
, 2549)



2.6 FRAP
(https://www.intechopen.com/source/html/48614/media/image2_w.jpg)

2.4

2.4.1

2.7

: *Cassia alata (L.) Roxb.*
: Leguminosae
: Ringworm Bush
:

- Avani (2010) *Tephrosiapurpurea* *Tephrosiapurpurea* *Leguminosae*

2

2.4.2

2.8

: *Barleria lupulina* Lindl.
: ACANTHACEAE

: Hop Headed Barleria
: ( )

(Biresh *et al.*, 2014)

2.4.3

2.9
: *Schefflera leucantha R. Vig.*
: Araliacea
: ( ), ( )

2.4.4

2.10
: *Citrus aurantifolia (Christm.) Swingle*
: Rutaceae
: Common lime
: ( )

(2554)

2.4.5

2.11

: *Rhodomyrtus tomentosa (Ait.) Hassk.*
: Myrtaceae
: Downy rose myrtle, rose myrtle, downy myrtle, hill gooseberry, hill guava, isenbery bush, Ceylon hill cherry
: ( ) Kuuam ( ) , , , ,

, (2548)

50%
8.192±16.385 mg/ml

2.4.6

2.12

: *Ocimum sanctum* L.
: LAMIACEAE (LABIATAE)

: Holy basil, Sacred Basil
: ( )
( ) ( )

2.4.7

2.13

:*Senna siamea* (Lam.) *Irwin &Barneby*
: LEGUMINOSAE – CEASALPINIOIDEAE
: Cassod tree, Thai copper pod
: ( ) ( )
( ) ( ) (,)
(-) (-)

anthraquinones

(, 2542)

2.4.8

2.14

: *Acacia insuavis* Lace
: LEGUMINOSAE
: Mimosoideae
:

1

2 (, 2542)

2.4.9

2.15

: http://www.papaidoo.com/uploads/news/news-3471.jpg
: *Centella asiatica* (Linn.) Urban.
: UMBELLIFERAE (APIACEAE)
: Asiatic pennywort
: , , ,

madecassosideasiatic acid, asiaticoside, centelloside, centellic acid brahminoside, brahmic acid

(, 2542)

2.4.10

2.16

: http://www.hhclgroup.com/userfiles/image/ .jpg

:*Tiliacora triandra* (Colebr) Diels

: MEISPERMACEAE

: limaciatriandra Miers

: ( ), , ,

( ), , ( ), , ( )

: tiliacorine, tiliacorinine, nor-tiliacorinine A, tiliacorinine 2-N-oxide, tiliandrine, tetraandrine, D-isochondendrine (isoberberine) aporphine, isquinolines

(, 2546)

2.4.11

2.17

: http://media.komchadluek.net/img/size1/2016/09/24/kcief8gjf9gabdck5ebbd.jpg

: *Azadirachta indica* A. Juss.

: MOLIACEAE

:

: ( ) ( )) ( )

limonoids nimbolide gedunin
“falciparum”
limonoids
“meliantriol” ($C_3OH_3O_5$)
“azadirachtin” (, 2554)

2.4.12

2.18
: guru.sanook.com
: *Andrographis paniculata* (Burm.f.) Wall.ex Nees
: ACANTHACEAE
:
: ( ) ( )

(antipyretic) (anti-inflammation)
(2543)
95% *E. Coli*

2.4.13

2.19
: www.9thai9.com
: *Zingiber cassumunar* Roxb.
: ZINGIBERACEAE

:
: (-),

8

6 *Salmonella typhimurium*, *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Listeria monocytogenes* *Mycobacterium smegmatis*

L. Monocytogenes
M. smegmatis
S. typhimurium
Enterococcus faecalis
S. aureus

3

(, 2554)

2.4.14

2.20
: frynn.com
: *Eupatorium odoratum* L.
: COMPOSITAE
:
: (- -), ( )

(plasmodium falciparum)

(, 2546)

Eupatol, Coumarin,d l-Eupatene, Lupeol, b–Amyrin Flavone Salvigenin Ceryl alcohol ; a-,b-,g-Sitosterol, Anisic acid,

Trihydric alcohol ($C_{25}H_{34}O_5$), Tannin, , Isosakuranetin, Odoratin Acacetin (, 2555)

2.4.15

2.21

: www.tonmai2jo.com

: *Streblus asper* Lour.

: MORACEAE

:

:

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3

3.1

3

1. Random sampling /
2. Chemotaxonomic approach antioxidant
3. Ethnopharmacological information
   (local knowledge)

3.2

60ºC 6
4ºC (
)

3.3

3.3.1

1:10 Vortex
5 Centrifuge 3000 rpm 4ºC 3
2 4ºC

3.3.2

1:10 Shaking water
bath 80ºC 30 Centrifuge 3000 rpm 4ºC
3 4º C

3.4

300 µL Folin-Ciocalteu 1500 µL
Vortex 5 (20% w/v) 1200 µL
30
765 nm
gallic acid gallic acid 5,
10, 15, 20 25 µg/mL

3.5

3.5.1 ABTS

$ABTS^+$ cation radical ABTS 7 mM
5 mL potassium persulfate ($K_2S_2O_8$) 140 mM 88 µL
16 Stock $ABTS^+$ cation radical
400 µL Stock $ABTS^+$ cation
radical 3.6 mL 6
734 nm tobx 0.01, 0.02, 0.04, 0.08 0.16
mM

% Inhibition = $[Abs_{control} - (Abs_{sample} - Abs_{blank}) / Abs_{control} \times 100]$

A_{contro}

$A_{test\ sample}$

3.5.2 DPPH

330µL DPPH 150mM
3mL 30 520 nm
tobx 0.02, 0.04, 0.08, 0.16 0.32 mM

% Inhibition = $[Abs_{control} - (Abs_{sample} - Abs_{blank}) / Abs_{control} \times 100]$

$A_{control}$

$A_{test\ sample}$

3.5.3 FRAP

FRAP acetate buffer (pH 3.6), TPTZ 10 mM HCl 40
mM Ferrous chloride 20 mM 10:1:1 (v/v)

400 µL FRAP 3 mL
4 600 nm
Ferric sulfate 31.25, 62.5, 125, 250 500 µM

4

4.1

15

4.1

		(µg GAE/100 g)
	184.642±0.008	21.839±0.001
	197.906±0.028	19.135±0.019
	235.360±0.005	15.802±0.030
	386.733±0.002	26.184±0.023
	284.517±0.006	11.195±0.012
	3.378±0.005	3.100±0.002
	174.378±0.001	58.767±0.006
	113.267±0.006	8.600±0.017
	2.356±0.015	3.600±0.001
	37.600±0.004	19.933±0.001
	27.590±0.011	6.533±0.044
	16.649±0.005	3.235±0.002
	40.116±0.022	3.066±0.004
	129.070±0.004	16.808±0.018
	56.290±0.020	2.431±0.004

* 3 ±

15

Folin-Ciocalteu reagent

gallic acid 386.733±0.002 µg
GAE/100g 58.767±0.006 µg
GAE/100g

(-OH)

(Duh Yen, 1997) 15

(4.1) (2554)

4.2 ABTS

4.2 ABTS 15

	% Inhibition	
	54.748±25.938[d]	53.253±1.835[f]
	40.171±4.430[c]	77.828±1.458[g]
	39.601±2.069[c]	57.257±0.229[f]
	93.970±2.632[g]	45.445±11.099[e]
	35.185±2.944[bc]	79.229±5.117[gh]
	16.163±1.118[a]	14.407±2.821[ab]
	23.309±1.124[ab]	12.147±0.374[ab]
	16.787±2.057[a]	12.382±0.163[ab]
	12.902±1.477[a]	10.311±0.882[a]
	21.631±2.535[a]	18.879±5.710[bc]
	95.953±2.877[g]	73.131±4.747[g]
	79.089±6.408[ef]	54.918±2.457[f]
	70.377±6.010[e]	23.890±1.414[cd]
	80.101±1.180[ef]	85.891±3.060[h]
	88.139±2.834[fg]	28.668±2.496[d]
Trolox 0.04 mM (10 µg/ml)	33.663±0.003	

* 3 ± a-g ANOVA

ABTS

734 nm trolox ABTS

(4.2)
95.953±2.877 % 93.970±2.632% (
27.590±0.011 386.733±0.002 µg GAE/100g)
(p<0.05) ABTS
85.891±3.060% trolox
(33.663±0.003%)

4.3 DPPH

4.3 DPPH 15

	% Inhibition	
	40.337±2.953[a]	26.510±9.605[c]
	65.004±1.639[e]	45.882±2.471[ef]
	64.650±1.326[e]	40.189±1.129[de]
	64.789±0.899[e]	37.799±0.263[d]
	66.323±1.654[e]	50.467±4.263[ef]
	55.592±2.028[d]	18.205±5.084[b]
	47.733±0.362[a]	17.686±6.558[b]
	51.183±0.923[bc]	17.653±9.497[b]
	49.858±1.371[ac]	9.010±0.960[a]
	49.683±0.555[ac]	24.858±2.198[bc]
	86.710±0.130[i]	82.258±0.209[h]
	76.721±0.136[h]	68.795±0.113[g]
	71.249±0.164[g]	68.730±0.130[g]
	70.901±0.075[g]	85.494±0.164[h]
	68.686±0.075[f]	69.555±0.136[g]
Trolox 0.04 mM (10 g/ml)	53.460±0.020	

* 3 ± a-g
ANOVA

DPPH

DPPH 30
520 nm
DPPH
86.710±0.130%
DPPH 85.494±0.164% 82.258±0.209%
(p<0.05) (4.3)
trolox (53.460±0.020%)

4.4 FRAP

4.4 FRAP 15

	Fe^{2+}	
	171.550±9.321[d]	34.264±3.605[a]
	389.147±6.048[g]	46.434±5.660[a]
	425.814±6.482[h]	62.326±7.614[a]
	469.767±1.208[ij]	164.341±6.669[b]
	448.760±5.908[i]	154.806±28.749[b]
	40.564±5.997[b]	146.205±4.005[b]
	323.726±13.593[f]	410.598±149.172[c]
	38.427±6.815[b]	335.607±13.205[c]
	20.393±2.693[a]	72.786±10.004[a]
	58.940±2.594[c]	414.410±16.432[c]
	459.368±6.467[i]	546.912±19.189[d]
	374.456±8.508[g]	346.912±22.032[c]
	278.316±21.752[e]	345.860±42.901[c]
	545.684±8.854[jk]	205.333±2.596[b]
	645.333±10.291[l]	414.410±16.432[c]
$FeSO_4 \cdot 7H_2O$ 500 µM (140 µg/ml)	496.462±0.006	

* 3 ± a-g
ANOVA

FRAP

reducing agent power

FRAP 10

600 nm

$FeSO_4 \cdot 7H_2O$

Fe^{3+} Fe^{2+}

645.333±10.291 µM

546.912±19.189 µM

FeSO4•7H2O 500 µM (140 µg/ml) (496.462±0.006 µM)

(Al-Dabbas *et al.*, 2006) Karthikumar *et al.* (2007)

(*Ecliptaprotrata* L.) hexane, ethy acetate, ethanol, water

(2551)

DPPH ABTS assay acetone, 80% ethanol, 80% methanol

Ferrous sulfate heptahydrate (500±0.058 µM)

5

5.1

5.1.1 386.733±0.002 µg GAE/100g
5.1.2 58.767±0.006 µg GAE/100g

5.2 ABTS

5.2.1 95.953±2.877 %
93.970±2.632%
5.2.2 85.891±3.060%

5.3 DPPH

5.3.1 86.710±0.130%
5.3.2 DPPH
85.494±0.164% 82.258±0.209%

5.4 FRAP

5.4.1 645.333±10.291 µM
5.4.2 546.912±19.189 µM

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5.5

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http://eherb.hrdi.or.th/search_result. (: 30 2559).

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(*Boesenbergia pandurata*). , ( ), 351-354.

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Radical Scavenging Agent. . . . .

Adriana Maria Fernandes de Oliveira, Lilian Sousa Pinheiro, Charlane Kelly Souto Pereira, Wemerson Neves Matias, Roosevelt Albuquerque Gomes, Otemberg Souza Chaves, Maria de FátimaVanderlei de Souza, ReinaldoNóbrega de Almeida and TemilceSimões de Assis. 2012. Total Phenolic Content and Antioxidant Activity of Some Malvaceae Family Species.*Antioxidants.*

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มหาวิทยาลัยราชภัฏสงขลา
SONGKHLA RAJABHAT UNIVERSITY